

We claim:

1. A classifier comprising:

(i) a cylinder having a circumferential edge with indents arrayed in increasing size

5 from a first end of the cylinder to a second end of the cylinder,

where the indents are sized to capture pieces of a predetermined size or

smaller and to reject pieces of a size larger than the predetermined size,

where each indent is shaped as half an ellipsoid,

(ii) a conveyor running longitudinally adjacent the cylinder,

10 (iii) a drive mechanism rotatably mounted to the cylinder.

2. The classifier of claim 1, where the conveyor is a vibratory conveyor.

3. A classifier comprising:

15 a first rotating disk having a circumferential edge with one or more indents sized to capture silicon pieces of a first size or smaller and to reject silicon pieces of a size larger than the first size,

a second rotating disk having a circumferential edge with one or more indents sized to capture silicon pieces of a second size or smaller and to reject silicon pieces of a size larger  
20 than the second size, wherein the first size is smaller than the second size.

4. The classifier of claim 3, where the rotating disks are arrayed such that the first rotating disk has the smallest sized indents and the last rotating disk has the largest sized indents.

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5. The classifier of claim 3, further comprising a conveyor aligned with the rotating disks in a manner to convey a mixture of silicon pieces of varying sizes from the first rotating disk to the last rotating disk.

30 6. The classifier of claim 5, where the conveyor is selected from a vibratory conveyor, a bucket conveyor, a belt conveyor, or a hopper.

7. The classifier of claim 3, where each indent has a shape selected from cubic, cylindrical, half-cylindrical, ellipsoidal, half-ellipsoidal, or wedge.

8. A system comprising:

5 a heater for heating a silicon workpiece to a temperature of 600 to 1400 °F,  
a spray quench apparatus for spraying the silicon workpiece with fluid from a nozzle,  
a separator for extending cracks in the silicon workpiece to form a mixture of silicon  
pieces of varying sizes, and

10 a rotary indent classifier for sorting the mixture of silicon pieces into at least two size  
distributions.

9. The system of claim 8, where the heater is selected from a laser, an infra-red, or a  
microwave heater.

15 10. The system of claim 8, where the separator is selected from a mechanical, sonic, or  
vibrational separator.

11. The system of claim 8, where the rotary indent classifier comprises a rotating disk  
having a circumferential edge with one or more indents sized to capture polycrystalline  
20 silicon pieces of a predetermined size or smaller and to reject polycrystalline silicon pieces of  
a size larger than the predetermined size.

12. The system of claim 8, where the rotary indent classifier comprises a rotating cylinder  
having a circumferential edge with indents arrayed in increasing size from a first end of the  
25 cylinder to a second end of the cylinder, where the indents are sized to capture silicon pieces  
of a predetermined size or smaller and to reject silicon pieces of a size larger than the  
predetermined size.